

November 6, 1995

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Ms. Linda Elliott
Project Manager
Petroleum Sites Management
Vermont Department of
Environmental Conservation
103 South Main Street
Waterbury, Vermont 05676

H951880

RE: West Barnet Garage - Expressway Site Investigation Summary Report

Dear Ms. Elliott:

Table 1,

In response to finding significant petroleum contaminated soil and ground water during an underground storage tank (UST) removal and abandonment, Bradford Oil Company, Inc. (BOC) contracted Lincoln Applied Geology, Inc. (LAG) to perform an Expressway Site Investigation at the West Barnet Garage (WBG). The data collected during the site investigation indicates that significant soil and ground water contamination is present and further delineation of contaminant extent and magnitude is necessary. Contaminant levels measured on-site indicate that a significant amount of adsorbed and dissolved phase contamination remains on-site which has the potential of affecting receptors including the stream, interior building spaces, and water supplies. The site appears to be amenable to expeditious remediation, if necessitated. Therefore further investigation of the degree and extent of contamination is needed. This work will be performed in a manner to assist with Corrective Action Feasibility Investigation (CAFI) and Corrective Action Plan (CAP) generation, if deemed necessary.

Enclosed for your information and use are the following work products:

Table 2,	PID Assays;
Table 3,	Ground Water Quality Summary;
Figure 1,	General Location Map;

Ground Water Elevation and Product Thickness Data;

Figure 2, General Eccation Map,

Figure 3, Ground Water Contour Map for September 28, 1995;
Figure 4, Water Quality Summary Map for September 19, 1995;
Figure 5, Proposed Soil Gas and Monitoring Well Locations;

Appendix A, Underground Storage Tank Removal Form;

Appendix B, Well Logs;

Appendix C, Water Quality Results;

Appendix D, Local Well Owner and Adjoining Property Owner List; and

Appendix E, Cost Estimate for Additional Investigations for CAFI.

The WBG is located adjacent to Harvey's Lake Stream which drains Harvey's Lake

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directly to the north in West Barnet. The general site location is depicted on **Figure 1**. The location of the contaminated stockpiled soil is also shown on **Figure 1**. A detailed site map is included as **Figure 2**. To familiarize you with the data collected during the underground storage tank (UST) removal and new UST installation, the UST removal form is included as **Appendix A**.

The soils in the Harvey's Lake Stream area are mapped generally as pluvially deposited silts and very fine sands. The pluvial soil type was confirmed by the boring logs included in **Appendix B**. The locations of the four borings and monitoring wells are shown on **Figure 2** as MW's 1, 2, 3, and 4.

As described in **Appendix A**, UST Removal Form, and **Appendix B**, Well Logs, the site is underlain by several feet of sandy gravelly fill placed directly atop native silts and very fine sands. Bedrock was not encountered on-site. Ground water was encountered between 3 and 4 feet below grade. Significant gasoline odor was present and positive photoionization detector (PID) assays were obtained throughout the vadose zone and saturated soil to depths of 7 to 14 feet below grade. Below this depth PID readings were minimal. The highest level of PID quantifiable contamination was noted in the former UST area (MW-4) between 5 and 8 feet below grade at 220 parts per million (ppm). The water bearing zone beginning between 3 and 4 feet below grade exists primarily within the native silty fine sand soils. However, mottling (an indicator of high ground water levels) indicates that ground water may fluctuate to within 2 feet of grade and into the fill. Well construction details for MW's 1 - 4 are also included in **Appendix B**.

Ground water elevation and headspace PID data was collected on September 28 and October 10, 1995. The ground water elevations are included in **Table 1** and the headspace PID assays are included in **Table 2**. The water levels were measured with an interface probe capable of measuring free floating product thicknesses as thin as 0.01 feet. No free floating product was measured, although elevated PID levels were seen in all four of the monitoring well on-site. Elevated PID readings (up to 2.6 ppm) were also measured in the WBG shallow well. It should be noted that this well is not used as a potable water supply. It is used for washing hands and other non consumptive purposes. Screening of the adjacent residence basements gave background PiD readings. The WBG is slab on grade construction with no basement or crawl space.

Utilizing the water level data collected on September 28, 1995 a ground water contour map has been prepared as **Figure 3**. This map confirms expected ground water flow towards Harvey's Lake Stream. It appears that this general flow direction remains constant regardless of the level of water behind the Harvey's Lake Dam adjacent to the site. Any petroleum contaminants emanating from the former UST area or pump island would be expected to flow towards MW-3, the WBG shallow well, and the dam. The sidegradient



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component is unknown so it is quite possible that contaminated ground water associated with the former UST area is present and migrating beneath the WBG.

Each of the monitoring wells on-site along with adjacent water supply wells were sampled on September 19, 1995. The WBG shallow well and Harvey's Stream upstream of the dam were also sampled. No access could be gained to the Mackey residence, so their well was not sampled. Copies of the formal analytical results are included in **Appendix C**, and a summary of the data is presented in **Table 3**. No quantifiable levels of dissolved contamination were found in the Coppenwrath, Fitzgerald, or White water supply wells. These homeowner's were notified of analytical results by a letter sent from us on October 13, 1995. A list of the local drinking water supply well owners and addresses is included as **Appendix D**. The WBG shallow well and each of the monitoring wells on-site contains elevated levels of petroleum related contamination. The highest level of contamination was seen in MW-3 with a total BTEX concentration of 49,300 ppb and MTBE quantified at 3,600 ppb. No quantifiable levels of BTEX or MTBE were found in the Harvey's Lake Stream at the upper dam pin sampling location. The areal distribution of the soluble phase contamination is depicted on **Figure 4**. It is apparent that relatively high concentrations of dissolved contaminants are present beneath parts of the WBG.

After review of the compiled data several potential receptors have been identified adjacent to the WBG. The WBG shallow well currently has petroleum contamination in it. The potential for Harvey's Lake Stream to be impacted by contaminated ground water seepage is high. The White and Coppenwrath residence basements and to a limited extent the WBG airspaces may be affected by petroleum vapors associated with the WBG soil contamination. Each of the water supplies directly adjacent to the WBG (particularly the Coppenwrath shallow well) are also potential receptors.

On October 10, 1995 the contaminated soils stockpile generated during UST replacement was screened with a PID. An average PID assay of 42 ppm was measured in the 180 cubic yard stockpile. The location of the contaminated soil stockpile is shown on **Figure 1** and the details of the soils removal are included in **Appendix A**.

In conclusion, the data collected during the Expressway Site Investigation indicates that:

- Substantial dissolved and adsorbed petroleum contamination exists beneath the entire site.
- 2. The complete extent and degree of contamination on-site has not been adequately defined.



- The WBG shallow well has been adversely affected by petroleum contamination.
- 4. Harvey's Lake Stream and the surrounding drinking water supplies have not been affected by petroleum contamination.
- 5. The main component of ground water and dissolved contaminant flow is from the former UST area towards the Harvey's Lake Stream, the WBG well, and the dam. A secondary sidegradient component is potentially carrying some dissolved phase contamination beneath the WBG towards the dam and the southern corner of the Coppenwrath property.
- 6. The levels of BTEX and MTBE contamination dissolved in the ground water beneath the site are significant enough to potentially cause adverse impacts to the Harvey's Lake Stream and the drinking water supplies unless remediated.
- 7. The site appears to be amenable to expeditious cleanup, and the current levels of contamination at the WBG coupled with the potential sensitive receptors adjacent to the site necessitate further investigation of the degree and extent of the contamination.

Based on the preceding conclusions it is our recommendation that further investigation of the degree, extent, and relationship to potential receptors of gasoline related contamination beneath the WBG site be conducted to define overall remediation requirements, goals, and potential methods (if necessary). The additional investigation is proposed to include:

- 1. A limited soil gas survey should be conducted in and around the WBG building to determine appropriate locations for wells required in or downgradient of it. The soil gas survey will help define locations and also allow the collection of soil gas samples (for analysis) from the source area and vapor phase affected area. The soil gas survey data will help define the significance of the vapor impacts and provide real time input data for the design of a vapor extraction system, if and when considered. The soil gas survey will be conducted from inside the building to outside using the pattern shown on **Figure 5**. Soil gas will be analyzed with a PID and by activated trap/volatile analysis.
- 2. Five monitoring wells should be placed in the approximate locations shown on **Figure 5**. Four wells will be installed using direct push vibratory methods



Stockaled soils?

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with continuous soil sampling. Due to limited access, the well between the building and the dam will be installed by hand methods. All soil samples will be screened to define textural characteristics and PID quantifiable contaminant levels.

- 3. If significant contamination is identified beneath the WBG building and downgradient of the WBG building in the Harvey's Lake Dam area, select soil samples acquired during boring installation will be analyzed to define the level of adsorbed contamination in these areas. A soil sample will also be taken from the former source area to determine the level of adsorbed phase contamination remaining in this portion of the site. This data is essential in accurately conducting the CAFI and generating a CAP, if deemed necessary.
- 4. An accurate stadia survey should be performed to locate the relative position and elevation of the new wells in order to generate accurate ground water contour maps.
- 5. All monitoring wells and nearby drinking water supplies should be resampled for the presence of BTEX and MTBE.
- 6. Following the summarization of the extended site investigation, a CAFI of expeditious coremedial approaches to site remediation can be performed, if deemed necessary. The feasibility of these remedial techniques will be determined by utilizing existing and new on-site monitoring wells.

We look forward to your response and will contact you in the next week to discuss the conclusions and recommendations. Included in **Appendix E** is a work plan and cost estimate for the extended site investigation so that work can proceed in the near future. If you have any other questions or concerns with regard to the data presented in this report or the site in general please feel free to contact me at 453-4384.

Sincerely,

Steven LaRosa Hydrogeologist

SL/smk enclosures

cc: Bill Sellinger



Project: West Barnet Garage Location: West Barnet, Vermont

Table 1 VDEC Site # N/A Sheet 1 of 1

Ground Water Elevation/Product Level (feet)

Data Point	TOC	09/28/95	10/10/95	 	
MW-1	100.00	96.29	96.68		
10100-1	100.00	30.23	30.00	 	
MW-2	99.21	94.54	94.91		
MW-3	99.93	93.56	93.68		
MW-4	100.12	95.16	95.63		
Upper Dam Pin	96.79	91.97	92.82		
Lower Dam					
Pin	96.79	87.82	87.49		
West Barnet Garage					
Shallow Well	99.84	92.29	_, ≤92,191		

Notes:

2 - Reference elevation is elevation of top of PVC well casing Light Grey Cell = DRY

Dark Grey Cell = Inaccessible

^{1 -} Elevation datum assumed

Project: West Barnet Garage Location: West Barnet, Vermont

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Table 2 VDEC Site # N/A Sheet 1 of 1

Photoionization Results (PID - ppm)

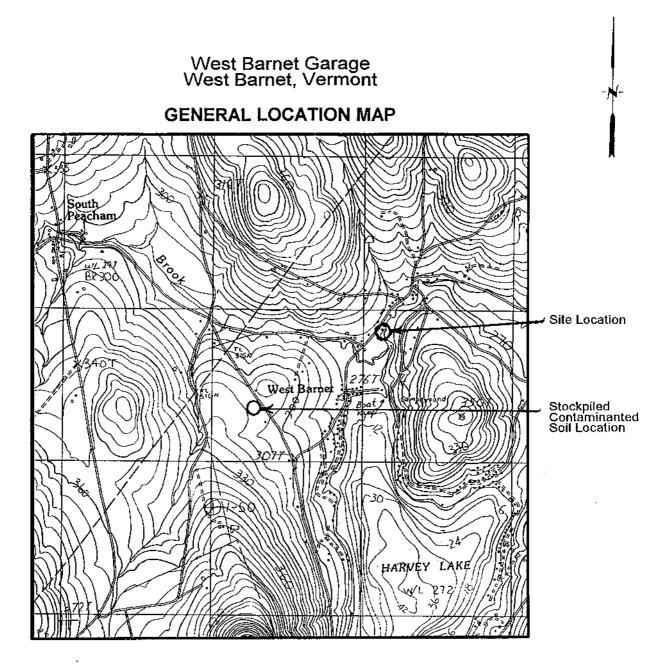
Data Point	09/28/95	10/10/95			
MW-1	200	SL			
MW-2	186	26			<u> </u>
MW-3	SL	160			
MW-4	SL	SL			
West Barnet Garage					
Shallow Well	0.2	2.6			

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Table 3 VDEC Site # N/A Sheet 1 of 1

Ground Water Quality Results (ppb)

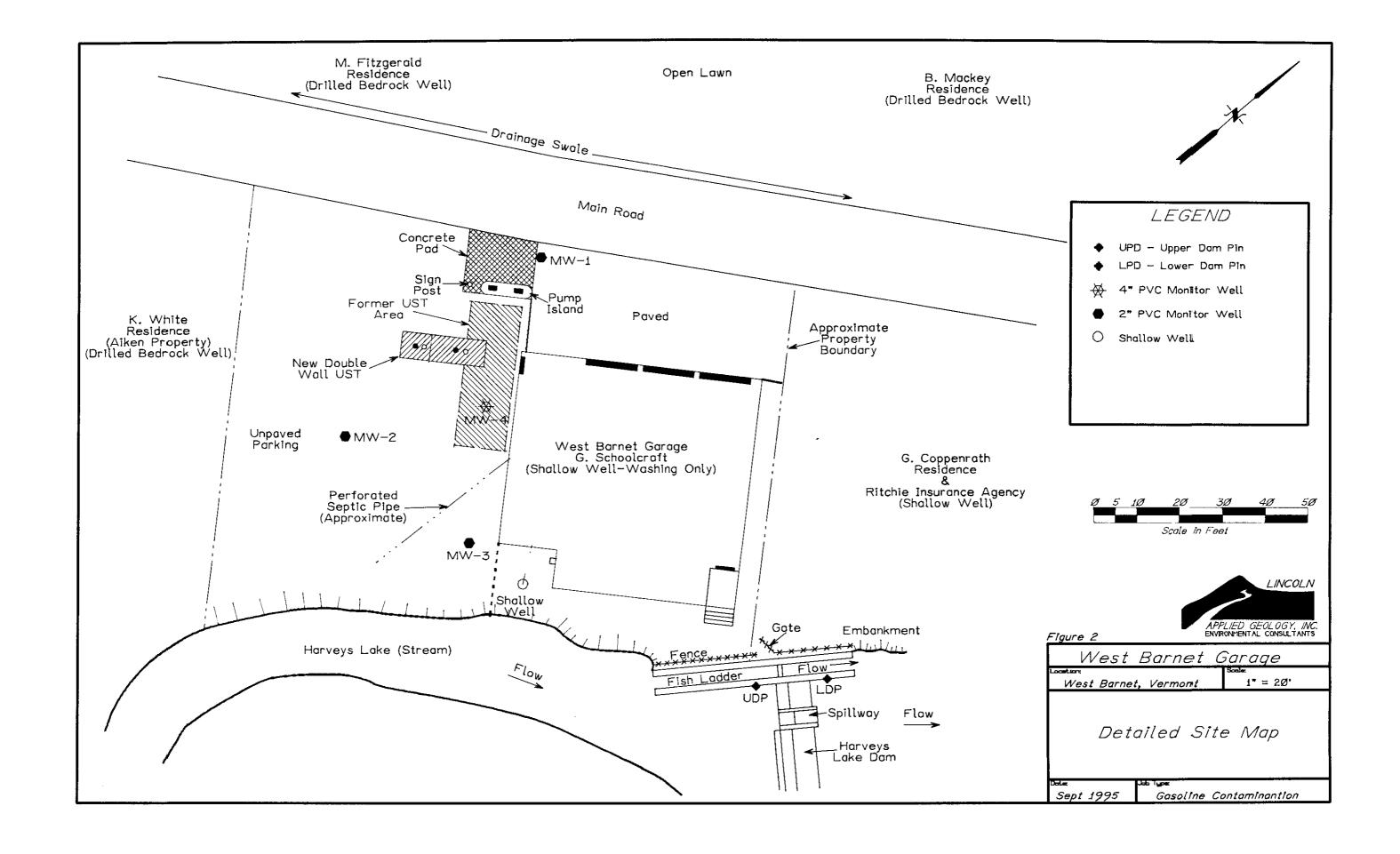
Data Point	09/19/95			
	<5			
MW-1	231			
	700			
MW-2	1,000			
	3,600			
MW-3	49,300			
-	2,400			
MW-4	19,900			
	<5			
Upper Dam Pin	<6			
Lower Dam Pin				
West Barnet Garage				
Shallow Well	2,500	l		
	<5			
Coppenwrath Well	<6			
	<5			
Fitzgerald Well	<6			
	<5			
\\/hite\\/ell	<6			

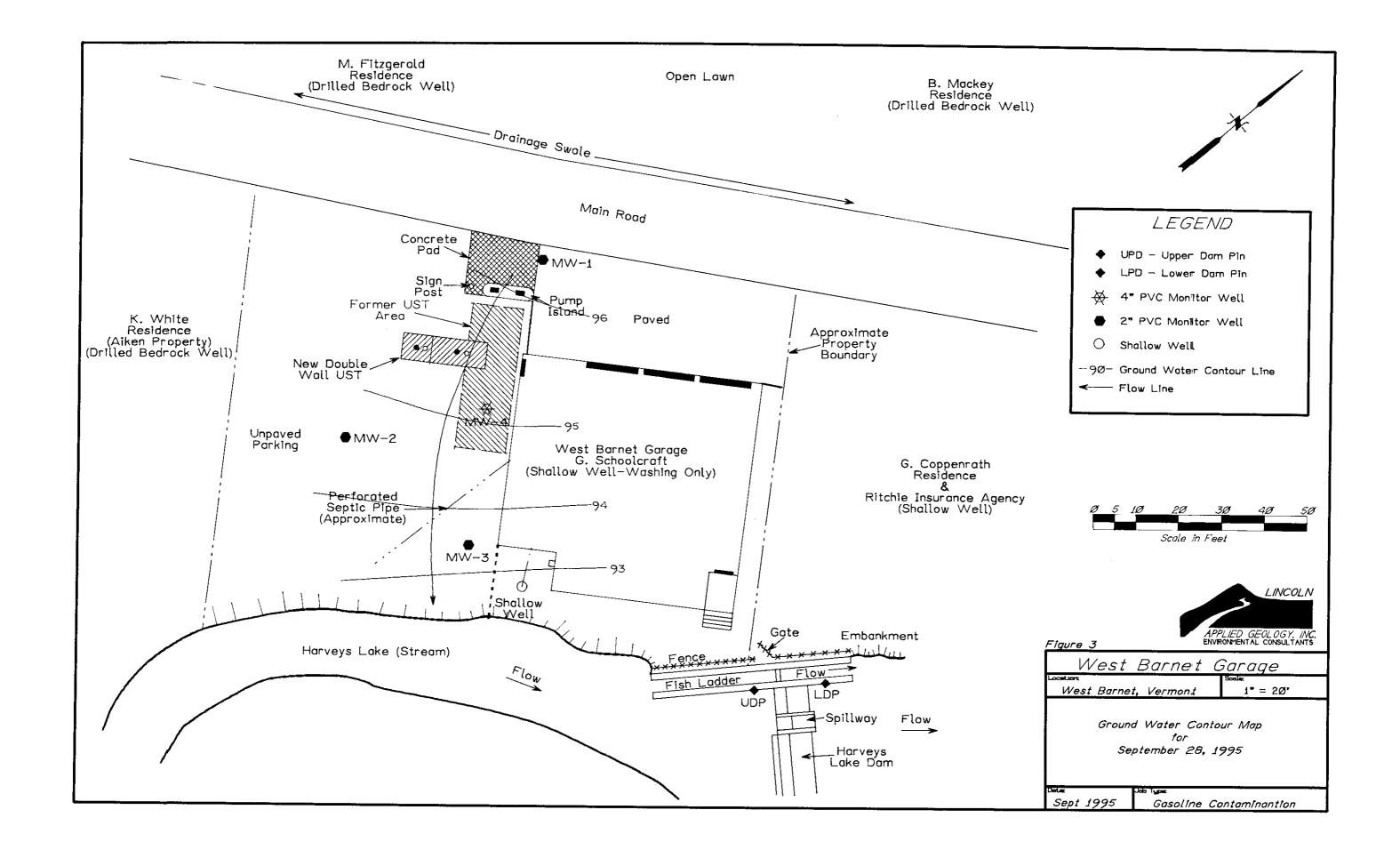


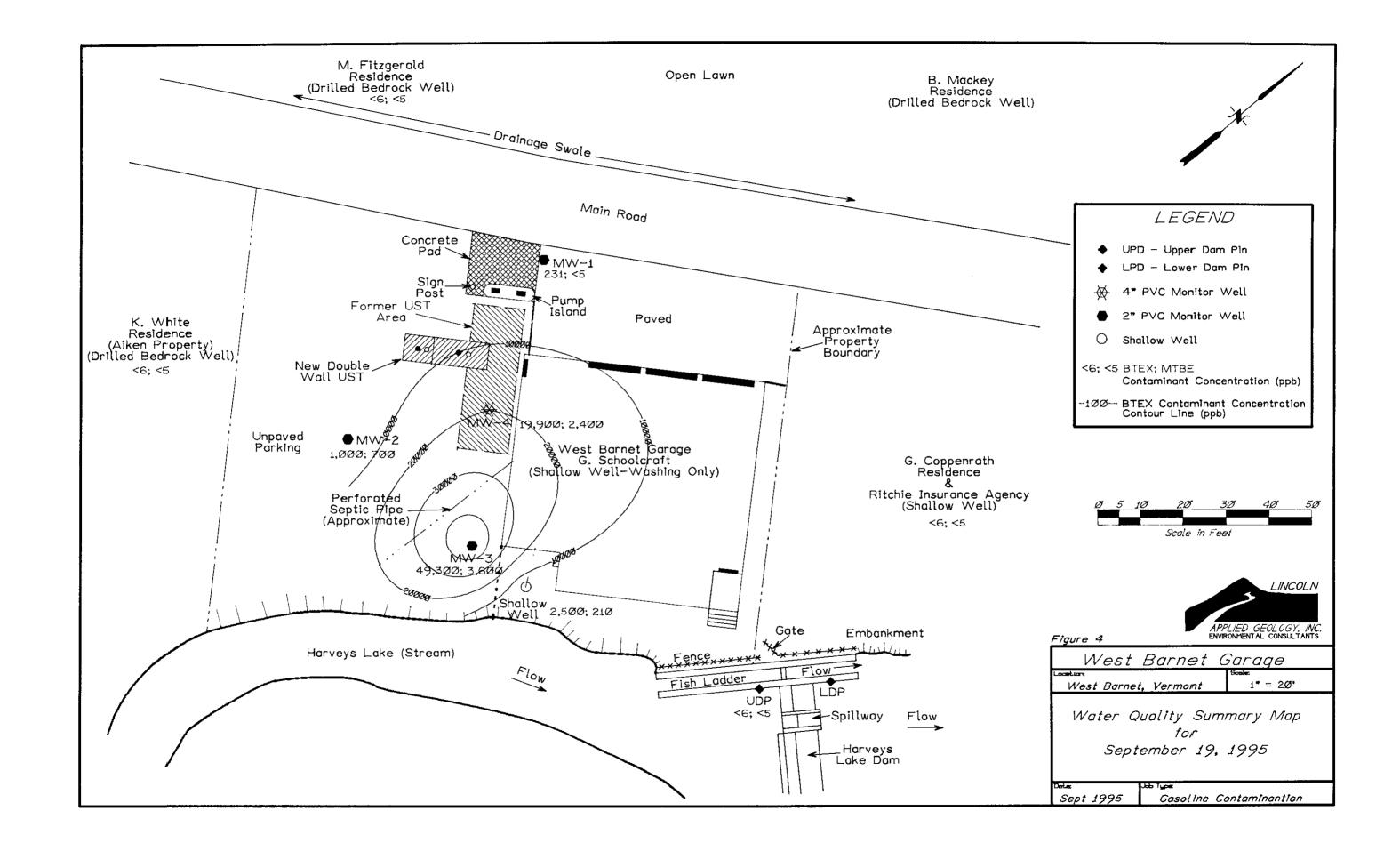
Source:

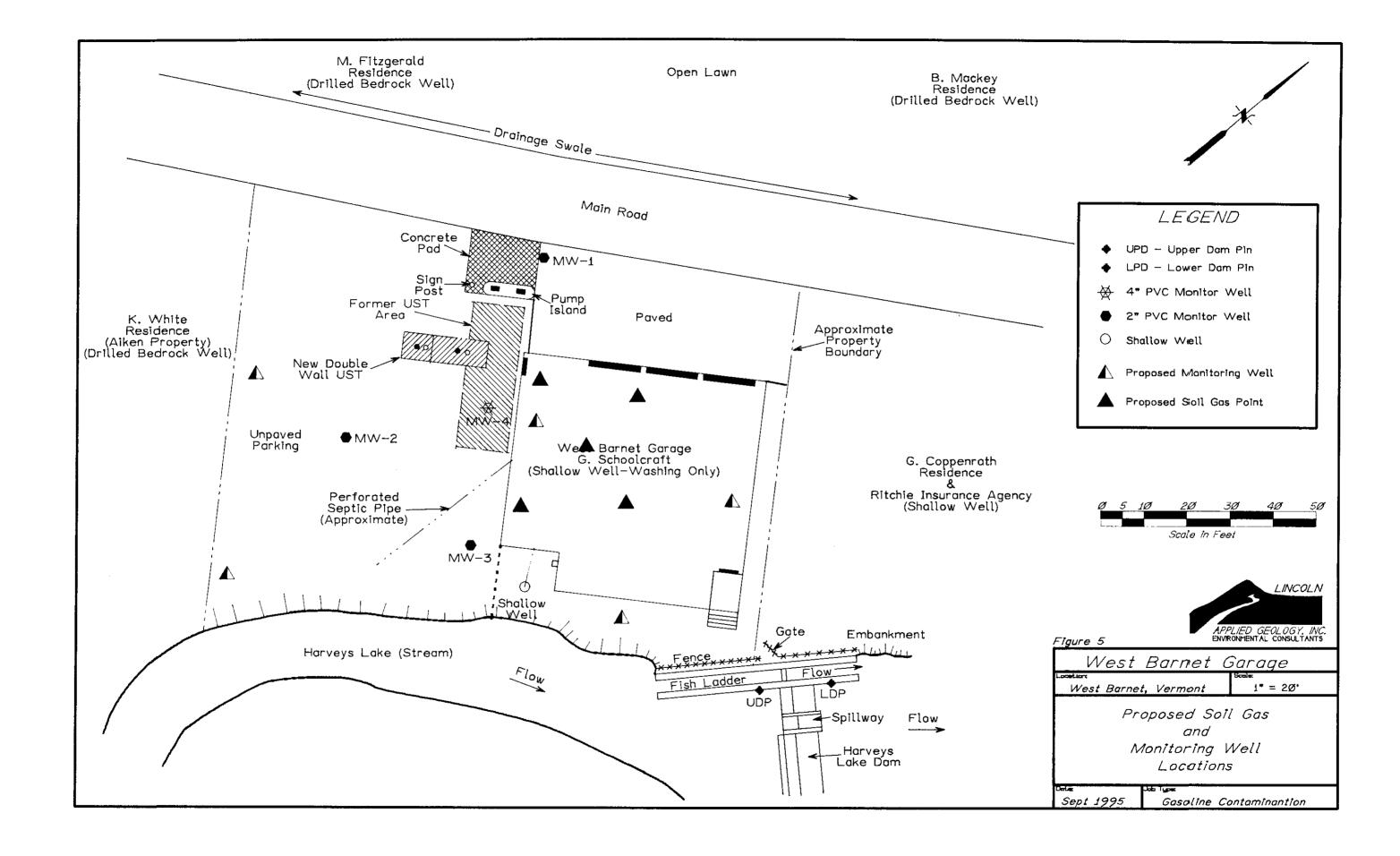
7.5 x 15 Min Quad. Barnet, VT-NH Provisional Edition 1983

Scale: 1:25,000 metric

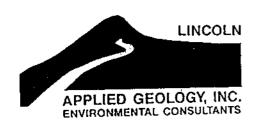








Appendix A Underground Storage Tank Removal Form



Α,

Mr. Ted Unkles
Underground Storage Tank Program
Department of Environmental Conservation
103 S. Main St.
Waterbury, VT. 05671

RE: Underground Storage Tank Removal and Closure at the West Barnet Garage

West Barnet, VT.

Dear Mr. Unkles:

Bradford Oil Company (BOC) contracted Lincoln Applied Geology Inc. (LAG) to assist in the removal of two underground storage tanks (USTs) at the West Barnet Garage in West Barnet, Vermont. One 2,000 gallon regular unleaded UST and a 1,000 gallon super unleaded gasoline UST were removed. The 1,000 gallon tank gave indications of product loss and water intake in late June of 1995. The tank was immediately removed from service and removal scheduled.

The 2,000 gallon UST (UST 1) was removed first. The soils directly surrounding the UST consisted of sandy fill materials and gave quantifiable PID readings greater than 50 parts per million (ppm) from approximately 1 foot below grade to 9 feet below grade. UST 1 was in good condition (see enclosed photographs) and gave little to no evidence of weepage or active leakage. UST 2, the 1,000 gallon UST had 168 gallons of contaminated ground water removed by BOC prior to excavation. During removal of UST 2 highly contaminated soils were evidenced throughout the entire excavation to a depth of 10 feet. Free phase adsorbed product was noted on the soils directly beneath the tank for a depth of 3 feet (i.e. 10 feet below grade). Inspection of UST 2 revealed a 0.25 inch diameter hole as shown in the enclosed photographs. The hole was associated with what appears to be a large gouge or imperfection in the UST.

Excavation within the UST area to a depth of 10 feet did not encounter ground water or bedrock. Generally fill materials are found from 0 - 5'. The native soils found from 5 feet and deeper consist of very fine sand and silty very fine sand. The native materials are highly contaminated (> 500 ppm to saturated lamp by PID) and show evidence of being in contact with seasonal high ground water. It is assumed that ground water flows from the UST area towards the stream on the southern property line. No sheen was evident in the stream during UST removal activities.

Any soils excavated to facilitate removal of the UST's were returned to the UST areas. A new 3,000 gallon baffled tank was installed on September 15, 1995. Any

Mr. Ted Unkles Page 2 September 18, 1995

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contaminated soils excavated in association with this UST will need to be stockpiled off-site for future analysis and treatment. We estimate that the total amount of soils to be stockpiled will be approximately 80 cubic yards. We are currently obtaining the appropriate approvals from the property owner, Town, and the VDEC for off-site stockpiling.

A number of potential receptors are present surrounding the site. These include: ground water, soil, domestic water supplies, residential basements, and the surface water mentioned above. LAG is planning to install ground water monitoring wells, perform basement PID surveys, and obtain water supply samples from the neighboring residences within the next week. LAG is proceeding with the Expressway Site Investigation method of performing the site investigation and necessary analysis. The level of contamination on-site will necessitate future monitoring and also may require some level of remediation. We will be submitting our Expressway report within the required time frame.

If you have any questions with regard to the abovementioned information, please do not hesitate to call me at 453-4384.

Sincerely,

Steven LaRosa Hydrogeologist

SL/Ir Enclosure

cc: Bill Sellinger

State of Vermo	THE WALL WITH	
		AGENCY OF NATURAL RESOURCES Department of Environmental Conservation
of Fish and Village	SEP 12 1995	Herardous Materials Management Division
of Forests Peris and Recreation		103 South Main Street/West-Office
of Environmental Conservation	LINCOLN APPLIEU GEOLOGY, INC	Waterbury, Vermont 05671-040-
ecuros Conservation Council		FAX (802) 244 614
HANCE LOU LIFE HEARING INVALUED.		
007-solow		
		MOTERATERIA
SITE INVEST	NGATION EXPRESSW	AY NOTIFICATION
te Owner: Bradford 011	Company Inc.	
	- Co-cas West Barnet V	
	et Garage, West Barnet, V	
X Vec this site will martis	ipate in the Site Investigation I	Expressway Process.
No, this site will not pa	rticipate in the Site Investigation	on Expressway Process.
f yes, please complete the che	eldist below:	
	present in soils above action le	wels X Yes No
✓ Contamination	present in soms and	
If we	summarize levels:	
Known	release levels up to sat	urated lamp on PID
	ADMINISTRAÇÃO DE COMPANSA DE C	
Free product of	ibserveu <u> </u>	On Soils
		Yes XX No
Groundwater Groundwater	contamination observed.	
	contamination observed	Yes X No.
2011ace water		
/ Suspected rela	ease of hazardous substances	Yesx No
		Barrell State of the Control of the
If yes	, please explain:	
and the second of the second o	ptors X Yes No	
	I I add recentors in	duding names and addresses of third.
	有一些人的	
recep	lors: 1. ground water contamina	tion expected
		

UNDERGROUND STORAGE TANK PERMANENT CLOSURE FORM

UNDERGRO	OUND STO
AGENCY USE ONLY School closure date: Facility Town: Burnet Facility 101: W.B. Garage DEC Official: Evaluated by:	VERMONT A DEPT. OF E HAZARDOU 103 SOUTH WATERBUR TELEPHONE
This Closure Form may only scheduled closure date should returned to the above address; environmental consultant coverelevant data, must accompany required by 29 CFR 1910.120 performed in compliance with statutes, regulations, and additions.	be phoned in the pink copy ring all aspect this form. A Documentation DEC policy
Section A. Facility Information	

VERMONT AGENCY OF NATURAL RESOURCES DEPT. OF ENVIRONMENTAL CONSERVATION HAZARDOUS MATERIALS MANAGEMENT DIV. 103 SOUTH MAIN STREET, WEST BUILDING WATERBURY, VERMONT 05671-0404 TELEPHONE: (802) 241-3888

Company conducting
with a measurement Lincoln Applied Geo
Person conducting
with assurements Steve LaRosa
Telephone number of
company for persons 453-4384
Date of UST closurer

Date of other companies: 9-14-95

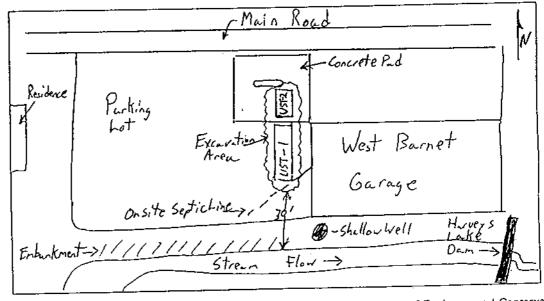
This Closure Form may only be used for the facility and date indicated in the upper left hand corner. Changes in the scheduled closure date should be phoned in at least 48 hours in advance. Both the vellow and white copies must be returned to the above address; the pink copy should be retained by the UST owner. A written report from an environmental consultant covering all aspects of closure and site assessment, complete with photographs and any other relevant data, must accompany this form. All procedures must be conducted by qualified personnel - including training required by 29 CFR 1910.120. Documentation of all methods and materials used must be adequate. All work must be performed in compliance with DEC policy "UST Closure and Site Assessment Requirements" as well as all applicable statutes, regulations, and additional policies. The DEC may reject inadequate closure forms and reports.

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	Section A. Facility Information: Number of Employees: 2 Number of Employees: 2						
Name of Facility:	West Barnet G	arage		_ Number of Ch	spioyees		
Street address of	facility: Main Ro to be closed: B	radford Oil Co	mpany Inc.				
Name of Contact	and telephone rou	wher if different t	from owner: B1	ll Sellinger			
Mailing address of	of owner: P.O. B	ox 394, Bradio	rd, VT.05033				
Telephone number	er of owner: 802	-222-5250					
Section B. UST	Closure Information UST Closure: UST is being closure permanent closure	on:(please check o	∷ted Leak L		tacementAb	andoned	
			Tank	Tank	Piping	Piping	
11000#	Bendust	Size (gallons)	age	condition	age	condition	
UST#	Product regular gas	2,000	20 years	good	20 years	good	
	regular gas			leaking	20 years	good	
	super gas	1,000	20 years	Teaking			
							
ł							
Tank cleaning of Certified hazardo Hazardous waste USTs not closed	nd type of waste gompany (must be transcount out waste hauler (e generator ID nur of this portion min use", "to be inquire permits and	tin confined space entry):_ tank contents are hazardous a nber:none ust be filled in to astalled", or "not	Bradford Oil must within recovered and in include all US aware of any o	Ts. regardless of	none size, and status	, *whether most new	
Mistaliations Tex		Size	Tank	*Tank	Piping	*Piping Status	
UST#	Product	(gallons)	age	Status	Age	Status	
1	regular⊇	3,000 gal.	new	to be instal	ed new	to be install	
.	 			T	<u> </u>		
ļ	 						
<u> </u>	<u> </u>			 		<u> </u>	
			<u> </u>		<u> </u>	<u> </u>	
Section C. Initial site characterization: Work in this section must be completed by a professional environmental consultant or hydrogeologist with experience in environmental sampling for the presence of hazardous materials. A full report from the consultant must accompany this form. Excavation size (ft²): 300							
PID Informatio	n: Make: <u>ны</u> п		Mod-	ei: <u>Pi ini</u>			

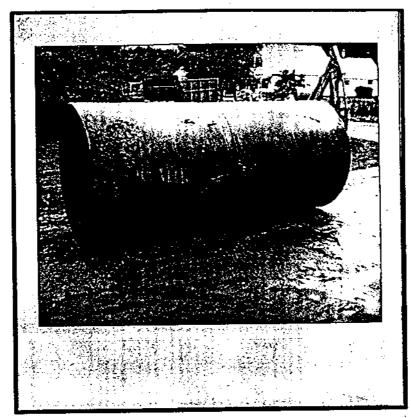
PID Calibration information: Date 9-13-95 Contamination detected with PID (ppm): Soil samples collected for laboratory analysis? Time 4.00pm Type of Gas Isobutylene Peak St. Depth of peak (ft) 8 Avg 200 ppm Yes # of samples No X (show locations and depth of all readings and samples on diagram).
Have soils been polyencapsulated on site? Yes list amount (co. yda.): No
Name of DEC official granting approval to transport soils: Amount of soils backfilled. (a. yd.): 10 Avg.PID 200 ppm Have limits of contamination been defined? Yes No x Are you aware of any other contaminants which may be present? Yes No x Comments:
Free phase product encountered? Yes thickness No Croundwater encountered? Yes depth(ft) No X
Were there existing monitoring wells on site? Yes(# samples taken) NoX Have new monitoring wells been installed? Yes(# samples taken) NoX Samples collected from monitoring wells for lab analysis? Yes NoX tinclude well localized, and belonging wells for lab analysis? Yes No Is there a water supply well or spring on site? Yes (check type: shallow dug rock spring) No How many public water supply wells are located within a 0.5 mile radius? none min. distance (ft): How many private water supply wells are located within a 0.5 mile radius? 8-10 min. distance (ft): What receptors have been impacted? xsoit indoor air xgroundwater surface water water supply
Section D. Statements of UST closure compliance: (must have both departures of the second and complete) As the party responsible for compliance with the Vermont UST Regulations and related statutes at this facility, I hereby certify that all of the information provided on this form is true and correct to the best of my knowledge.
Signature of UST owner of conner's authorized representative
As the environmental consultant on site, I hereby certify that the site assessment requirements were performed in accordance with DEC policy and regulations, and that information which I have provided on this form is true and correct to the best of my knowledge. Date: Sept. 14, 1995
SITE DIAGRAM

. 1

Show location of all tanks and distance to permanent structures, sample points, areas of contamination, potential receptors and any pertinent site information. Indicate North arrow and major street names or route number.



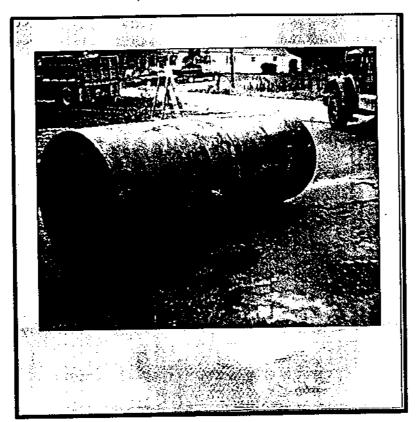
Return form along with complete narrative report and photographs to the Department of Environmental Conservation, Underground Storage Tank Program within 72 hours of closure.



Photograph #1 UST #1 - 2,000 Gallons



Photograph #2 UST #1 Tank Saddle



Photograph #3 UST #2 - 1,000 Gallons



Photograph #4 UST #2 - 0.25" Hole

Appendix B
Well Logs

WELL:

:

MW-1

LOCATION:

West Barnet Garage, West Barnet, Vermont - NW corner of pump island

DRILLER:

Tri-State Drilling and Boring, Inc., West Burke, Vermont

HYDROGEOLOGIST:

William Norland, Lincoln Applied Geology, Inc.

DATE:

September 19, 1995

Soi	ls i	Des	crip'	tion:

(BG = \underline{B} ackground [0.2], SL = \underline{S} aturated \underline{L} amp [>500], ppm = \underline{P} arts \underline{P} er \underline{M} illion)

<u>Depth</u>	<u>Description</u>	PID (ppm)
0 - 0.25	Dry, black, asphalt pavement.	
0.25' - 2'	Dry, black, <u>fine sand and silt</u> , little fine to coarse gravel. <u>Fill</u> . Old gasoline odor.	200
2' - 2.5'	Boulder.	
3' - 3.4'	Moist, brown, silt; some very fine sand; little peat.	150
3.4' - 4.2'	Wet, grey, silt and very fine sand.	50
4.2' - 7'	Wet, grey with olive mottles, silt and very fine sand.	5.0 - 4.6'
7' - 15'	Wet, grey, <u>fine sand;</u> some fine to coarse gravel; little silt, moist sand. <u>Glacial</u> <u>till.</u>	3.0 - 9' 0.2 - 14'
	13' deep well installed.	

Well Construction:

Bottom of Boring:

15'

Bottom of Well:

Well Screen:

10'(3' - 13') 0.020" slot, 2" PVC, sch. 40

Solid Riser:

2.5' (0.5' - 3') 2" PVC, sch. 40

Sand Pack: Bentonite Seal: 11'.(2' - 13') 1' (1' - 2')

Backfill:

0.5' (0.5' - 1')

Well Box:

One - cemented flush with grade

WELL:

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MW-2

LOCATION:

West Barnet Garage, West Barnet, Vermont - S of UST and pump island in parking area

DRILLER:

Tri-State Drilling and Boring, Inc., West Burke, Vermont

HYDROGEOLOGIST:

William Norland, Lincoln Applied Geology, Inc.

DATE:

September 19, 1995

Soils Description:

(BG = \underline{B} ackground [0.2], SL = \underline{S} aturated \underline{L} amp [>500], ppm = \underline{P} arts \underline{P} er \underline{M} illion)

<u>Depth</u>	<u>Description</u>	PID (ppm)
0 - 3'	Sand and gravel parking area	
3' - 3.3'	Moist, tan, <u>fine sand;</u> little silt.	10.4
3.3' - 4.2'	Moist, dark brown <u>, silt;</u> some very fine sand; little peat.	90
4.2' - 7'	Wet, olive grey and brown, <u>fine to medium sand;</u> some silt; trace fine gravel. Strong old gas odor. Drill to 8' depth.	215
7' - 9.6'	Wet, olive grey and brown, <u>fine sand and silt;</u> some medium sand; little fine to medium gravel. <u>Glacial till</u> .	BG
9.6' - 12'	Wet, grey, <u>fine sand;</u> some medium sand; little fine to coarse gravel, silt. <u>Glacial till.</u>	BG
12' - 15'	Wet, grey, fine sand and silt; some fine to coarse gravel; little medium to coarse sand. Glacial till.	BG
	13' deep well installed.	

Well Construction:

Bottom of Boring:

15'

Bottom of Well:

13'

Well Screen:

10' (3' - 13') 0.020" slot, 2" PVC, sch. 40

Solid Riser:

2.5' (0.5' - 3') 2" PVC, sch. 40

Sand Pack: Bentonite Seal: 11' (2' - 13')

Delifornie (

1' (1' - 2')

Backfill:

0.5' (0.5' - 1')

Well Box:

One cemented flush with grade.

WELL:

ţ

MW-3

LOCATION:

West Barnet Garage, West Barnet, Vermont - Near SE corner of building by stream

DRILLER:

Tri-State Drilling and Boring, Inc., West Burke, Vermont

HYDROGEOLOGIST:

William Norland, Lincoln Applied Geology, Inc.

DATE:

September 19, 1995

Soils Description:

(BG = \underline{B} ackground [0.2], SL = \underline{S} aturated \underline{L} amp [>500], ppm = \underline{P} arts \underline{P} er \underline{M} illion)

Depth	Description	PID (ppm)
0 - 3'	Sand and gravel parking area	
3' - 6'	Moist, dark brown, <u>fine to medium sand;</u> little silt; fine to coarse gravel. <u>Fill</u> . Old gas odor. Drill to 8' depth.	15.2
6' - 8.5'	Wet, grey, <u>silt;</u> little very fine sand. Old gas odor.	40
8.5' - 12'	Wet, grey, fine sand; some silt; little medium sand, fine to coarse gravel. Glacial till.	35
12' - 15'	Wet, grey, <u>fine sand and silt;</u> little medium sand, fine to coarse gravel. <u>Glacial</u> <u>till</u> .	0.4
	13' deep well installed.	

Well Construction:

Bottom of Boring:

15' 13'

Bottom of Well:

13

Well Screen:

10' (3' - 13') 0.020" slot, 2" PVC, sch. 40

Solid Riser:

2.5' (0.5' - 3') 2" PVC, sch. 40

Sand Pack: Bentonite Seal: 11' (2' - 13') 1' (1' - 2')

Backfill:

0.5' (0.5' - 1')

Well Box:

One - cemented flush with grade

WELL:

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MW-4

LOCATION:

West Barnet Garage, West Barnet, Vermont - E. of new and former USTs

DRILLER:

Tri-State Drilling and Boring, Inc., West Burke, Vermont

HYDROGEOLOGIST:

William Norland, Lincoln Applied Geology, Inc.

DATE:

September 19, 1995

Soils	Descri	ption:

(BG = \underline{B} ackground [0.2], SL = \underline{S} aturated \underline{L} amp [>500], ppm = \underline{P} arts \underline{P} er \underline{M} illion)

<u>Depth</u>	<u>Description</u>	PID (ppm)
0 - 1'	Sand and gravel parking lot.	
1' - 5'	No sample - fell out of sampler. Backfill in former UST excavation.	
5' - 8'	Wet, dark brown, fine sand and silt; some medium sand. Strong gasoline odor.	220
8' - 10'	Wet, dark brown, <u>fine sand;</u> some medium sand, fine to coarse gravel; little silt. Strong old gas odor.	200
10' - 10.6'	Wet, dark brown, fine sand; some fine to coarse gravel; little silt.	75
10.6' - 12'	Wet, grey, <u>fine sand;</u> some silt; little fine to coarse gravel, medium sand. <u>Glacial till.</u> Strong old gas odor.	15 (11') 2.0 (12')
12' - 14'	No sample - drill around large boulder.	
	14.6' deep well installed	

Well Construction:

Bottom of Boring:

14.6' 14.6'

Bottom of Well:

10' (3' - 13') 0.020" slot, 4" PVC, sch. 40

Well Screen: Solid Riser:

2.7' (0.3' - 3') and 1.0' (13' - 14'). End plug 0.6' (14' - 14.6')

Sand Pack:

12.6' (2' - 14.6')

Bentonite Seal: Backfill:

1' (1' - 2') 0.5' (0.5' - 1')

Well Box:

One - cemented flush with grade

Appendix C Water Quality Results



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Green Mountain Laboratories, Inc.

RR#3 Box 5210 Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

REF #: 0182 Lincoln Applied Geology **CLIENT NAME:** not given PROJECT NO.: ADDRESS: RD1 Box 710 Bristol, Vermont 05443 9/19/95 DATE OF SAMPLE: West Barnet Garage SAMPLE LOCATION: DATE OF RECEIPT: 9/20/95 SAMPLER: Bill Norland DATE OF ANALYSIS: 9/20/95 - 9/21/95 DATE OF REPORT: 9/24/95 ATTENTION: Bill Norland

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl. The trip blank was prepared by the client from reagent water supplied by the laboratory.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The
 resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory OA/OC acceptance limits, unless noted otherwise.

Reviewed by:

Director, Chemical Services

Alla & Redict



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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	Coppenrath Well-at P. Tank
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1130
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 20, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND
		I

Surrogate % Recovery: 112 %



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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	Trip Blank
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	0800
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 20, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)	
Benzene	1	ND	
Toluene	1	ND	
Ethylbenzene	1	ND	
Xylenes	3	ND	
MTBE	5	ND	
		1	

Surrogate % Recovery: 112 %

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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	Harvey's Lake Stream-above Dam
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1030
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 20, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (μg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND
	2000 1070	1

Surrogate % Recovery: 107 %

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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	West Barnet Garage -Shallow Well Sink Tap
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	0945
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 21, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	10	780
Toluene	10	270
Ethylbenzene	10	250
Xylenes	30	1200
MTBE .	50	210

Surrogate % Recovery: 103 %





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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	MW-I
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1203
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 20, 1995	SAMPLE TYPE:	Water

PQL (µg/L)	Conc. (µg/L)
1	18
1	93
1	20
3	100
5	ND
	1 1 1

Surrogate % Recovery: 101 %

2 = **98**

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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	MW-2
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1250
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 21, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	10	370
Toluene	10	150
Ethylbenzene	10	120
Xylenes	30	360
MTBE	50	700
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Surrogate % Recovery: 106 %

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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	MW-3
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1300
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 21, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	100	14000
Toluene	100	20000
Ethylbenzene	100	2300
Xylenes	300	13000
мтве	500	3600
		,

Surrogate % Recovery: 105 %

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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	MW-4
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1455
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 21, 1995	SAMPLE TYPE:	Water
1			

PQL (µg/L)	Conc. (µg/L)
50	600
50	8200
50	1800
150	9300
250	2400
	50 50 50 150

Surrogate % Recovery: 99.8 %



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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	Fitzgerald Well-at P. Tank
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1530
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 21, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 107 %

RR#3, Box 5210 Montpelier, Vermont 05602

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Fax (802) 223-8688

March 1

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	West Barnet Garage	GML REF.#:	0182
REPORT DATE:	September 24, 1995	STATION:	White Well-at P. Tank
DATE SAMPLED:	September 19, 1995	TIME SAMPLED:	1630
DATE RECEIVED:	September 20, 1995	SAMPLER:	Bill Norland
ANALYSIS DATE:	September 21, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)	
Benzene	1	ND	
Toluene	1	ND	
Ethylbenzene	1	ND	
Xylenes	3	ND	
мтве	5	ND	
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Surrogate % Recovery: 112 %

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West Barnet Well Owners List

Merle Fitzgerald RR #1 Box 211A Barnet, VT 05821 Kimberly White RR #1 Box 211 Barnet, VT 05821

(802) 633-2855

(802) 633-3886

George & Susan Coppenrath HCR 30 Main Street

Bernice Mackey HCR 30

W. Barnet, VT 05821

Barnet, VT 05821

(802) 633-2855

(802) 633-2874

Appendix E

Cost Estimate for Additional Investigations for CAFI

West Barnet Garage Work Plan/Cost Estimate for Further Investigation and Report Generation Nov-95

Recommendation 5 Ground Water Sampling & Analysis

After a 1 week equilibration period all monitor wells will be appropriately monitored for water level, headspace PID, purged and sampled. Water supplies will be sampled from the tap after purging. The Harvey's Lake stream at the upper dam pin will also be sampled. All samples including, a trip blank will be analyzed for BTEX and MTBE.

Task 5 Ground Water Sampling and Analysis

Field Technician -	8.0	hr(s) @	\$30.00	per hour	\$ 240.00
Field Technician O.T	4.0	hr(s) @		per hour	\$ 180.00
PID and Interface Probe -	1.0	day(s) @	\$100.00	day	\$ 100.00
Generator and Pump -	1.0	day(s) @	\$110.00	day	\$ 110.00
Bailer(s) -	10.0	@	\$6.73	each	\$ 67.30
Mileage -	200.0	mile(s) @	\$0.30	per mile	\$ 60.00
Samples -	16.0	@	\$60.00	each	\$ 960.00

Total Task 4 \$ 1,717.30

Recommendation 6 Summarization of Extended Investigation

Task 6 Reporting

Principal/Senior Hydrogeologist -	1.0	hr(s) @	\$75.00 per hour	\$ 75.00
Professional Engineer -	4.0	hr(s) @	\$75.00 per hour	\$ 300.00
Hydrogeologist/Site Manager -	12.0	hr(s) @	\$45.00 per hour	\$ 540.00
Computer Technician -	6.0	hr(s) @	\$30.00 per hour	\$ 180.00
Administrative Assistant -	4.0	hr(s) @	\$30.00 per hour	\$ 120.00

Total Task 5 \$ 1,215.00

Total All Tasks \$ 8,302.95



West Barnet Garage Work Plan/Cost Estimate for Further Investigation and Report Generation Nov-95

Recommendations 1, 2, 3, and 4 - Soil Vapor Survey, Monitor Well Installation with Soil Sampling, and Stadia Survey

A minimum of 5 survey points will be monitored using an AMS probe set at 3' below ground surface. PID assays will be obtained by actively pumping air from the AMS probe into an HNU 10.2 eV PID. Carbon trap samples will be taken from two survey point locations using a personal sampling pump. Each sample will be analyzed by EPA Method 8260. Monitor wells will be installed after the soil gas survey. Due to access problems it will be necessary to install 1 hand auger well. All wells will be properly developed and constructed by industry standards. A split spoon sample will be taken by the drill rig in the source area.

Task 1 & 3 Soil Vapor Survey and Installation of Hand Augered Well (1)

Hydrogeologist/Site Manager -	12.0	hr(s) @	\$45.00	per hour	\$ 540.00
Field Technician -	8.0	hr(s) @	\$30.00	per hour	\$ 240.00
Field Technician O.T	4.0	hr(s) @	\$45.00	per hour	\$ 180.00
AMS Probe -	1.0	day(s) @	\$125.00	per day	\$ 125.00
PID (Photoionization Detector) -	1.0	day(s) @	\$75.00	day	\$ 75.00
Air Pump -	1.0	day(s) @	\$30.00		\$ 30.00
Carbon Trap Analysis -	2.0	@	\$175.00		\$ 350.00
³, —⇒8260 Samples -	2.0	@	\$150.00		\$ 300.00
Well Screen -	10.0	feet @	\$3.39	per foot	\$ 33.90
Solid Riser -	5.0	feet (@)	\$2.24	per foot	\$ 11.20
50 lb bags of sand -	4.0	@	\$10.58	each	\$ 42.32
Bentonite -	1.0	bag(s) @	\$10.92	each	\$ 10.92
Well Boxes -	1.0	@	\$36.80	each	\$ 36.80
Concrete -	1.0	bag(s) @	\$5.51	each	\$ 5.51
Development Equipment -	0.5	day(s) @	\$110.00	each	\$ 55.00
Mileage -	200.0	mile(s) @	\$0.30	per mile	\$ 60.00

Total Task 1 \$ 2.095.65

Task 2 A. Monitoring Well Installation (4) and Supervision

Driller's Charges -					\$ 1,540.00
Hydrogeologist/Site Manager -	12.0	hr(s) @	\$45.00	per hour	\$ 540.00
PID (Photoionization Detector) -	1.0	day(s) @	\$75.00	day	\$ 75.00
O2/LEL -	1.0	day(s) @	\$50.00	day	\$ 50.00
Development Equipment -	1.0	day(s) @	\$110.00	day	\$ 110.00
Mileage -	200.0	mile(s) @	\$0.30	per mile	\$ 60.00
? -> Soil Samples (8260) -	6.0	@	\$150.00	each	\$ 900.00

Total Task 2 \$ 3,275.00

Task 4 Stadia Survey will be performed concurrent with Tasks 1 and 2

